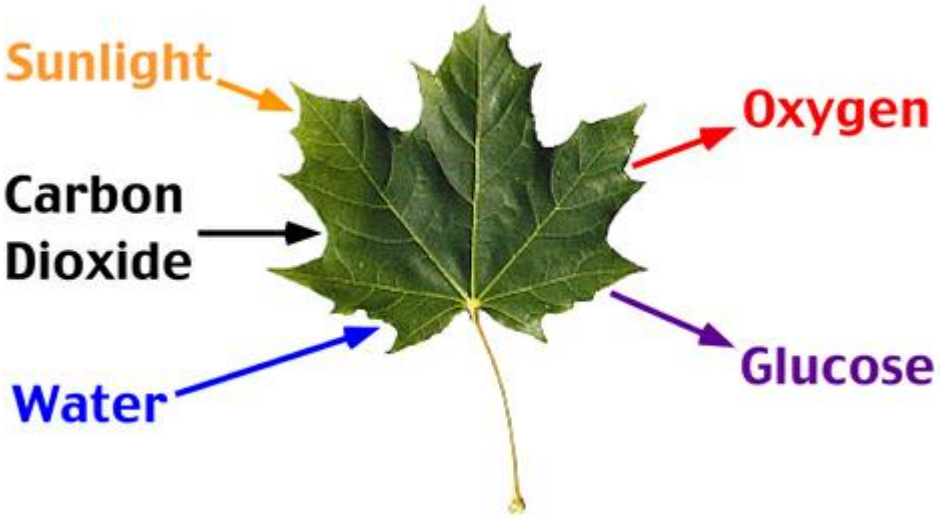

Leaves

Site of photosynthesis :



$$\text{Sunlight E} + 6CO_2 + 6\ H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

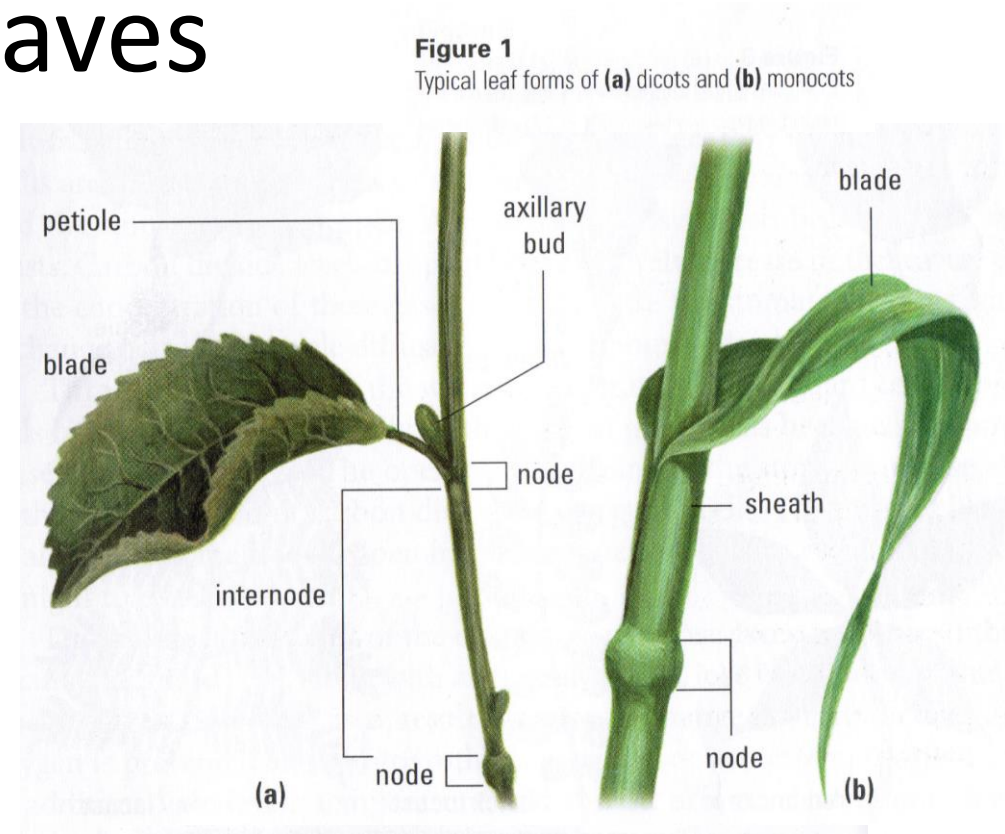
Photosynthesis requires:

- the molecule **CHLOROPHYLL** found in chloroplasts
- Chlorophyll – green pigment necessary to capture light energy
- the ability to exchange gas with the atmosphere
- regulation of water loss by openings (stomata and cuticle)

Leaves also provide habitat, food, shade and camouflage for other organisms

Leaves

- The **blade** is the flattened main body of the leaf.
- Leaves are positioned along the stem at point called **nodes**.
- The distance between successes nodes is called the **internode**.
- In many plants, each leave is connected to the stem by a leaf stalk called a **petiole**.
- Leaves have a network of veins or vascular bundles of conducting or supporting tissue.
- The arrangement of the veins within a leaf.
  - Monocot – parallel venation
  - Dicot – net venation (branch and rebranch)



Types of leaves

- Leaves can be simple, with just one blade, or compound, with several leaflets attached to the petiole.

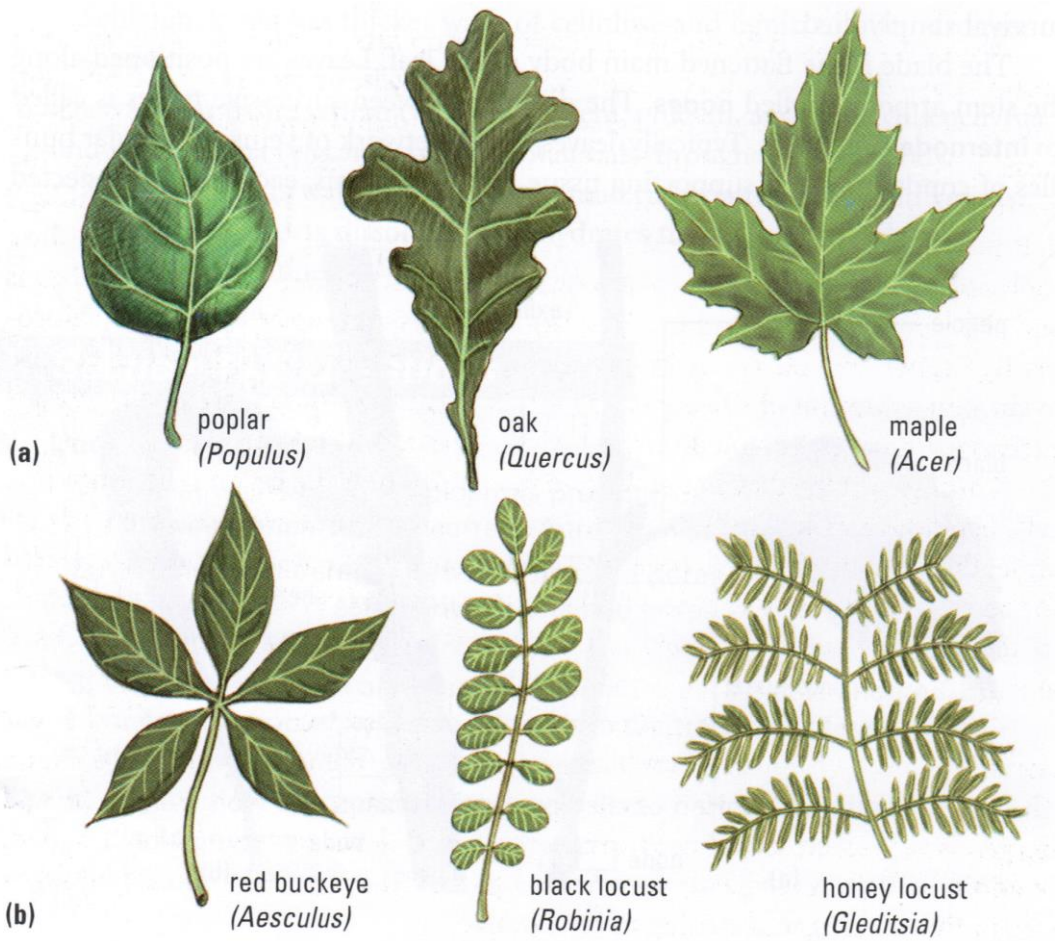
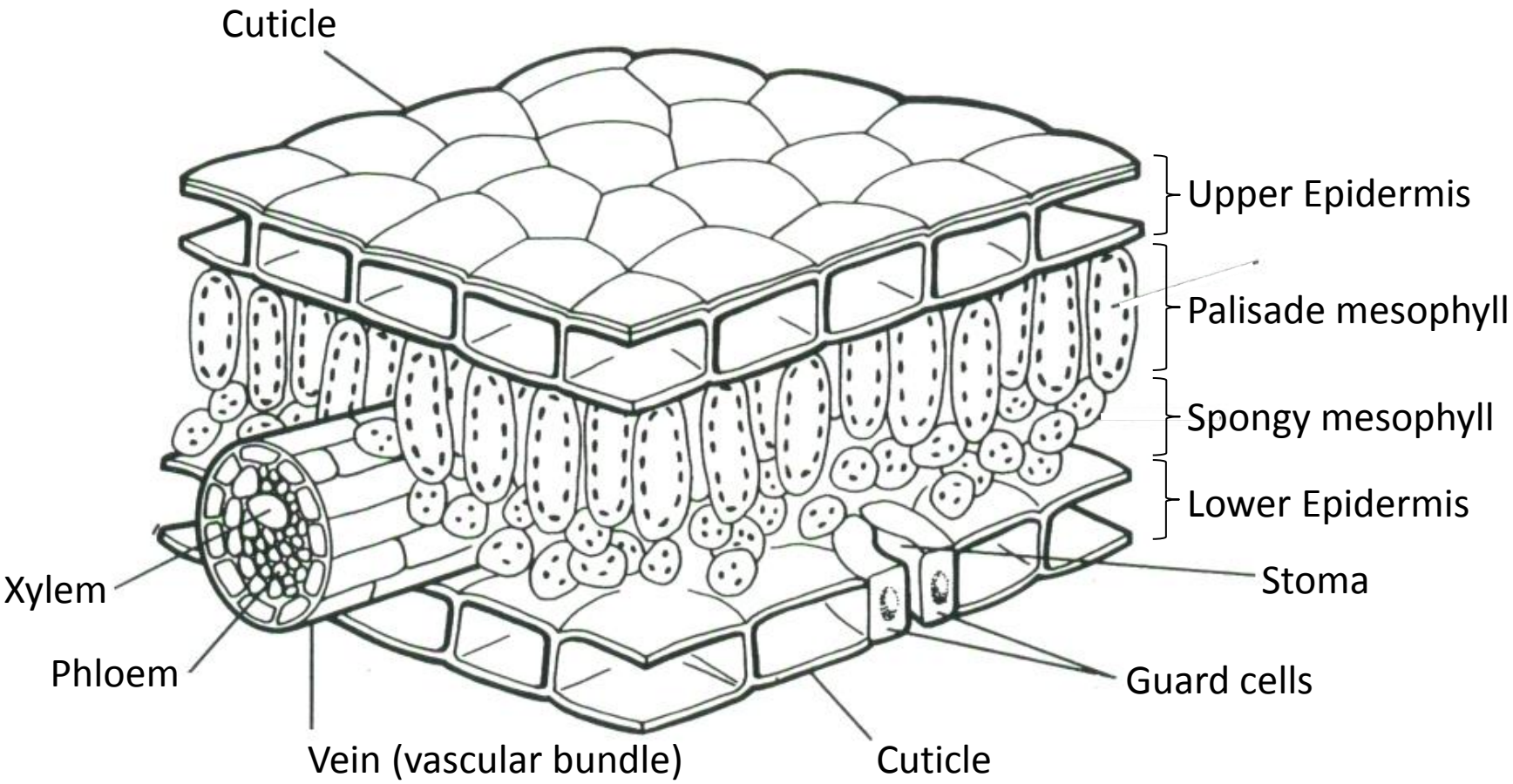


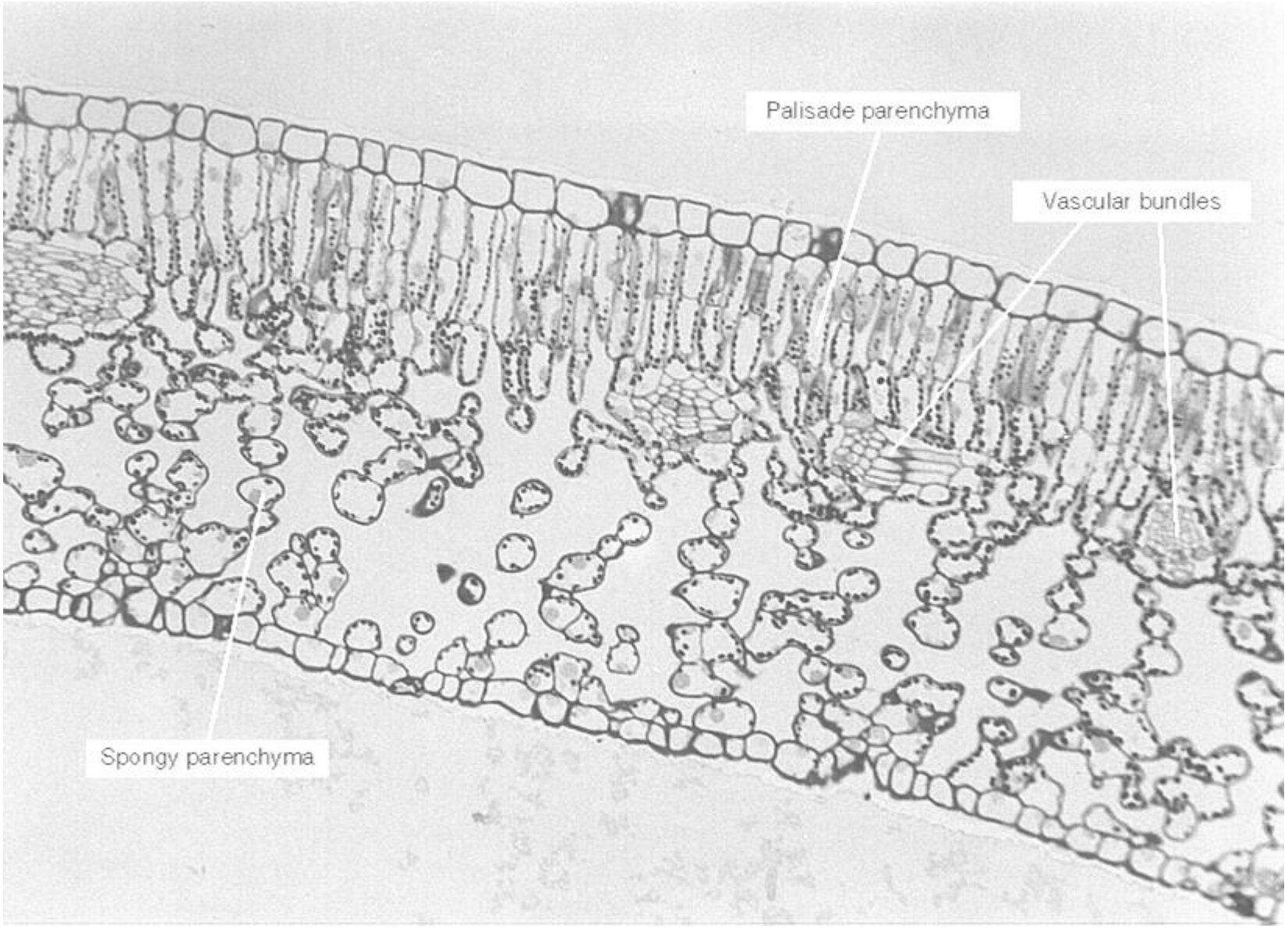
Figure 3
Examples of **(a)** simple leaves and **(b)** compound leaves

Internal Leaf Structure



Complete the rest of this table at home:

Leaf part	Structure	Role in Photosynthesis (or other role?)
Cuticle	Waxy coating	Prevents water loss and physical barrier
Upper epidermis	transparent	Light can pass through the cells within the leaf
Lower epidermis	transparent	Light can pass through the cells within the leaf
Vascular bundle	made up of xylem and phloem	transport water and nutrients needed for photosynthesis
Guard cells	Kidney-shaped cells	Control the opening and closing of the stomata
Stomata	Opening in the epidermis	Opening in leaves through which gases pass in and out of the leaves
Palisade mesophyll	Shaped like bricks and are tightly packed together	Contain many chloroplasts and are the primary site for photosynthesis
Spongy mesophyll	Fewer chloroplasts, and have large air spaces scatted among them	Promote rapid diffusion of CO2 into cell and O2 out of cell
Aerenchyma	loosely packed parenchyma cells with large pores between them	Helps leaves float on the surface of water



<u>Dicot leaf cross section</u> - Do you see the chloroplasts?

Leaf Adaptations

- **Leaves have adaptations to various abiotic and biotic factors**
  - Cactus spines – modified leaves (protect against herbivores)
  - Evergreen needles – less efficient for photosynthesis but they greatly reduce water loss.
  - Toxic compounds – milkweed produce a toxin which has a horrible taste – monarch butterfly caterpillars are immune.
  - Areas with low precipitation – extra thick, waxy cuticle to prevent water loss. Also less stomata.
  - Many more…